Environment Canada Environnement

Canada/Ontario Flood Damage Reduction Program
. Annual review
Date: 1989/90

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Canada - Ontario Flood Damage Reduction Program

Annual Review 1989-90

Environment Canada Environnement Canada

Ontario Ministry of Natural Resources Ministère des Richesses naturelles
Lyn McLeod Minister/Ministre

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Pearl L. McKeen, (Chairman)
Acting Manager
Policy and Program Development
Conservation Authorities and
Water Management Branch
Ontario Ministry of Natural Resources
Room 5620, Whitney Block,
Queen's Park
Toronto, Ontario
M7A 1W3
(416) 965-6286

Dr. S. Moin, Flood Studies Engineer
Water Planning and Management Branch
Inland Waters Directorate
Ontario Region
Environment Canada
Canada Centre for Inland Waters
Box 5050, 867 Lakeshore Road
Burlington, Ontario
L7R 4A6
(416) 336-4758

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The Honourable Lucien Bouchard
Minister
Environment Canada
Ottawa, Ontario

The Honourable Lyn McLeod
Minister
Ontario Ministry of Natural
Resources
Toronto, Ontario

Ministers:

I am pleased to submit the twelfth Annual Review of the Steering Committee for the Canada/Ontario Flood Damage Reduction Program. The review outlines work conducted under the program between April 1, 1989 and March 31, 1990.

Yours sincerely,

for Maurice G. Lewis
Director
Conservation Authorities and Water Management Branch

Attachement

DIRECTOR'S MESSAGE . . .

In 1989/90 we reached a high water mark in terms of accomplishments for the Canada/Ontario Flood Damage Reduction Program.

The Honourable Lyn McLeod, Minister of Natural Resources for the Province of Ontario and the Honourable Lucien Bouchard, Minister of Environment Canada signed an agreement to extend the Canada/Ontario Flood Damage Reduction Program Mapping Component until March 31, 1992, and the Terms and Conditions of the Agreement until March 31, 1997.

A flood plain management conference was held in March, 1990 attracting participants from all over the world. This conference provided a forum for promoting the Canada/Ontario Flood Damage Reduction Program via numerous presentations, displays, and speeches. The conference was jointly sponsored by the Ministry of Natural Resources, Environment Canada and the Association of Conservation Authorities of Ontario.

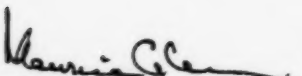
The Program's commitment to shoreline digital mapping continued with 8 conservation authorities on Lake Huron and Erie initiating projects. Completion of ongoing riverine projects remained high on the Program's priority list.

Under the Other Flood Damage Reduction Measures component, the Areal Snow Accumulation-Ablation Model, the Grand River Integrated Flood Forecasting System, the WATFLOOD Radar Study, the Benefit/Cost Analysis of Selected Projects under the Canada/Ontario Flood Damage Reduction Program, and the Alternative Flood Plain Mapping Techniques were completed.

Over 300 people attended 24 public information open houses, 19 projects were designated, and 4000 copies of the Program's newsletter "Flood News and Views" were released.

The success of the Program work plan and our recent accomplishments can only be attributed to effective partnership arrangements with the participating agencies. Conservation authorities and municipalities, Environment Canada, Energy, Mines and Resources Canada, and the Ontario Ministry of Natural Resources, play a vital role in program delivery. These agencies, working together, ensure sound and sustainable flood plain management practices in the Province of Ontario.

Thank you for your support in the past and with your continued cooperation in future we will realize our goal of delivering an effective flood plain management strategy in Ontario.



Maurice G. Lewis
Director
Conservation Authorities and
Water Management Branch

CANADA/ONTARIO FLOOD DAMAGE REDUCTION PROGRAM

1989/90 ANNUAL REVIEW

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WORK SUMMARY

In this twelfth year of the Canada/Ontario Flood Damage Reduction Program (FDRP) a total of 76 projects were jointly funded by Environment Canada and the Ontario Ministry of Natural Resources with shareable expenses of $2,042,788.06

The 1989/90 total expenditures were as follows:

A/ Conservation Authority	Total Expenditure
Ausable Bayfield	20,913.00
Cataraqui Region	121,205.74
Catfish Creek	10,552.00
Central Lake Ontario	18,091.99
Credit Valley	10,181.63
Essex Region	760.00
Grand River	21,222.23
Grey Sauble	15,836.70
Halton Region	18,371.33
Hamilton Region	32,890.00
Kettle Creek	18,816.50
Lake Simcoe Region	6,557.00
Long Point Region	69,372.13
Lower Thames Valley	81,743.70
Lower Trent Region	25,656.35
Maitland Valley	1982.00
Metro Toronto and Region	39,947.00
Mississippi Valley	5,178.61
Moira River	63,009.44
Napanee Region	2,547.15
Niagara Peninsula	79,981.40
Nickel District	1,949.50
North Bay-Mattawa	165.26
Nottawasaga Valley	100,158.00
Otonabee Region	67,192.00
Prince Edward Region	94,313.75
Raisin Region	627.47
Rideau Valley	4,889.58
Saugeen Valley	80,773.69
Sault Ste. Marie	1,871.00
South Nation River	34,770.75
St. Clair Region	64,300.30
SUB-TOTAL #1	$1,115,827.20

B/	Municipalities Outside of Conservation	Project Title	Total Expenditures
	Algonquin Region		
	Village of Bancroft Town of Herschel, County of Hastings	York River.	41,491.44
	Town of Bracebridge	Muskoka River	17,026.99
	Town of Gravenhurst City of Orillia Township of Rama	Severn River Black River	145,451.11
	Town of Huntsville	Big East River	3040.00
	Township of Sommerville	Burnt River	77,847.00
	Westmeath Township	Ottawa River	35,119.27
	Northern Region		
	Townhsip of Chapleau	Kebsquaseshing Rv. Nebskwashi River Bucciarelli Creek	266.20
	Town of Hearst	Mattawishkwia Rv.	396.71
	Town of Matheson	Black River Russell Creek	15,080.00
	North-Central Region		
	Village of Nolalu and Township of Red Rock	Whitefish River and Red Lake	26,227.00
	Northeastern Region		
	Village of Iron Bridge	Mississaugi River	1,394.06
	SUB-TOTAL #2		$363,339.78

C/	Other Flood Damage Reduction Measures Projects	Total Expenditures
	Alternative Flood Plain Mapping Techniques Study	14,965.00
	Benefit/Cost Analysis of Selected Projects under the Canada/Ontario Flood Damage Reduction Program	14,000.00
	Ontario Flood History Study	15,000.00
	Hydrograph Parameter Study	6,500.00
	SUB-TOTAL #3	50,465.00

D/	Other Expenditures	Total Expenditures
	Administration	109,832.19
	Main Office Shoreline	
	. Lake Ontario	158,527.86
	. Georgian Bay	201,999.27
	Cartography	21,529.03
	EMR Review	
	SUB-TOTAL #4	$533,838.34
E/	Audit Adjustments	(20,682.26)
	GRAND TOTAL	**$2,042,788.06**

Highlights

- Negotiations continued to extend the Canada/Ontario Flood Damage Reduction Program Agreement. The Minister of Environment Canada, Lucien Bouchard and the Ontario Minister of Natural Resources, Lyn McLeod have consented to extend the mapping component of the program until March 31, 1992 and the terms and conditions of the Agreement to March 31, 1997.

- The Program funded a total of 76 projects at a cost of $2,042,788.06.

- The National Flood Plain Management Conference was successfully held March 12-14, 1990 with over 400 participants from all over the world.

- The first issue of the FDRP newsletter 'Flood News and Views' was released at the National Flood Plain Management Conference.

- The Program sponsored several studies which were conducted by selected Ontario universities. These are discussed in greater detail in the Other Flood Damage Reduction Measures section.

- An informal study was commissioned from the Technical Sub-Committee member representing the Ministry of Municipal Affairs to determine flood risk areas facing development pressures. This study identified communities in Ontario that would benefit from flood plain mapping studies in the face of mounting urban development pressure.

- An FDRP workshop to review completed Other Measures projects was held on November 2-3, 1989 at the Westbury Hotel. Approximately 60 participants from conservation authorities, the Ministry of Natural Resources, Environment Canada and consulting agencies attended.

- Twenty-four public information open houses were held across the province, seven public information maps were printed and ninteen flood risk areas were designated.

- A series of regional meetings were held across the province. These meetings provided a medium for direct communication between participating program agencies. The meetings were held as follows:

Region	Date
Algonquin Region	April 20, 1989
Eastern Region	May 8, 1989
Southwestern Region	May 23, 1989
Central Region	June 5, 1989
Northern Ontario	Sept. 12, 1989

- Administrative guidelines for the Steering Committee, Technical Sub-Committee, Project Teams and general program administration were prepared to facilitate effective and efficient program delivery.

- Energy, Mines and Resources, on behalf of the Technical Sub-Committee, carried out the following mapping audits, as required by Section 8.05 of the Agreement:

- Lower Thames Valley Conservation Authority
  City of Chatham

- Nickel District Conservation Authority
  Whitson River

- Hamilton Region Conservation Authority
  Ancaster Sulpher Creek

Other Flood Damage Reduction Measures

- Floodway Flood Fringe Analysis - This study provides a methodology which may be used to determine the effect of flood plain encroachment on downstream flows and levels. This study was completed in-house at Environment Canada.

- Areal Snow Accumulation-Ablation Model ASAAM - A model was developed to provide a means of monitoring snowpack status within small watersheds for the entire winter. The model gives estimates of spatial distribution of snow cover amounts on the basis of daily meteorological observations (temperature, rain, snow) and snow accumulation characteristics of different land cover features within a watershed. This information is used to estimate initial snowpack conditions(eg. snow depth, equivalent water content) that are required as input to most hydrologic models for making predictions of snowmelt runoff events. This study was completed in-house at the Grand River Conservation Authority.

- Grand River Integrated Flood Forecast System GRIFFS This study develops a flood forecasting model which is a real time version of GAWSER, a HYMO derivative from the University of Guelph. The study was completed in-house at the Grand River Conservation Authority.

- WATFLOOD Radar Study - A real time flood forecasting model, WATFLOOD was developed. This model incorporates radar rainfall measurements, as well as satellite derived land use information. This study was completed at the University of Waterloo.

- Ice Jam Flood Frequency Study - Procedural methodologies for determining historical ice jam flood levels are established in this study. Ice Jam water levels often equal to or exceed equivalent open water levels. This study was completed by MacLaren Plansearch.

- Hydrograph Parameter Study - This study develops regional estimates for a number of hydrograph parameters such as time to peak, peak flow rate, volumes of runoff, hydrograph shape and relates these parameter to basin physical characteristics and precipitation. The first part of the study involves data analysis of 24 basins and is completed. The second part of the study involves a multiple regression analysis which was recently initiated.

University Studies

- Alternative Flood Plain Mapping Techniques - Alternative mapping procedures to provide economical and technically acceptable mapping for smaller communities are being identified and assessed in this study. Assessment inclused the accuracies, costs, effectiveness and the compromises involved in the use of alternative techniques. Millhaven Creek near Odessa, was selected as the case study. This study was conducted by Queen's University, Department of Civil Engineering.

- Benefit/Cost Analysis of Selected Projects under the Canada/Ontario Flood Damage Reduction Program
  This study involves a literature review, identification of benefit and cost categories, study of four communities, data analysis and report compilation. Wilfred Laurier University completed this analysis.

- Ontario Flood History Study - This document will provide a comprehensive chronology of flood events in Ontario. The historical flooding perspective will be derived from newspaper reviews for major Ontario daily's, and gauge records. A classification scheme for flood history is being developed based on the name of the event, duration, class, causal nature and magnitude. The study is being conducted by the Water Network, a consortium of Guelph, Waterloo, Wilfred Laurier and Western Ontario Universities.

Designations

The Minister of Environment Canada and the Ontario Minister of Natural Resources agreed to identify the following flood risk areas:

Conservation Authority Municipality	Watercourse(s)	Identification Date
Cataraqui Region	Gananoque River	May 15, 1989
Kettle Creek	Kettle Creek	May 15, 1989
Otonabee Region	Indian River	May 15, 1989
Otonabee Region	Otonabee River	May 15, 1989
Mississippi Valley Rideau River Regional Municipality of Ottawa Carleton Town of Rockland	Ottawa River	May 15, 1989
Mississippi River	Mississippi Rv.	May 15, 1989
Raisin Region	Entire Watershed	May 15, 1989
Village of Iron Bridge	Mississaugi River	May 15, 1989
Township of Ignace	Agimak River Agimak Lake	May 15, 1989
Town of Dryden	Swanson Creek Wabigoon River Wabigoon Lake	May 15, 1989
Township of Schreiber	Cooks Creek	May 15, 1989
Township of Lutterworth Township of Hindon Township of Minden Township of Lutterworth	Gull River	July 14, 1989
Metropolitan Toronto and Region	Lake Ontario Shoreline	August 31, 1989
Town of Bracebridge	Muskoka River	August 31, 1989
Town of Hearst	Mattawishkwia Rv.	January 31, 1990
Town of Chapleau	Kebsquasheshing River, Nebskwashi River, Bucciarelli Creek	January 31, 1990
Niagara Peninsula	Welland River Forkes Creek Black and Beaver Creeks	January 31, 1990
Maitland Valley	Lake Huron Shoreline No. 3.	January 31, 1990
Sault Ste. Marie Region	Root River	January 31, 1990

Special Policy Area Designations

The following Special Policy Areas in flood risk areas were designated on March 9, 1990:

Name of SPA	Municipality	Watercourse	Regulatory Flood Standard	Minimum Level of Protection
Ajax Pickering	Ajax	Duffin Creek Don Creek	Hazel	350 year
Bolton Village	Town of Caledon	Humber River	Hazel	500 year
Brampton Central	City of Brampton	Etobicoke Creek	Hazel	350 year
North Dixie	Mississauga City	Etobicoke Creek	Hazel	350 year
Wood-bridge Town	Woodbridge Town	Humber River	Hazel	350 year

All flood risk areas were officially identified on December 9, 1982. All are located within the Metropolitan Toronto and Region Conservation Authority.

Further development in the Special Policy Area could occur only if flood proofed to the Regulatory Flood Level. The regular policies of the Canada/Ontario Flood Damage Reduction Program do not apply to Special Policy Areas.

Public Information Open Houses

The following Public Information meetings (Open Houses) were held in support of the identification of flood risk areas:

Conservation Authority Municipality	Open House Date	Location of Flood Risk Area/Watercourse
Otonabee Region	May 16, 1989	Indian River
Otonabee Region	May 17, 1989	Otonabee River
Mississippi Valley Rideau Valley Regional Municipality of Ottawa Carleton Township of Rockland	May 31, 1989	Ottawa River
Mississippi Valley	June 1, 1989	Mississippi River
Rideau Valley	June 20, 1989	Rideau River
Maitland Valley	August 12, 1989	Lake Huron Shoreline Town of Ashfield
Town of Huntsville	August 31, 1989	Big East River
Sault Ste. Marie Region	Sept. 13, 1989	Root River
Town of Hearst	Sept. 20, 1989	Mattawishkwia River
Village of Bancroft Town of Herschel County of Hastings	Sept. 26, 1989	York River
Niagara Peninsula	October 18, 1989	Black and Beaver Creeks
Niagara Peninsula	October 19, 1989	Welland River and Forkes River
Ausable-Bayfield	October 24, 1989	Town of Lucan
Ausable Bayfield	October 25, 1989	Town of Crediton
Credit Valley	November 1, 1989	Flood Damage Centres
Nottawasaga Valley	November 27, 1989	Silver Creek, Black Ash Creek (Collingwood)
Nottawasaga Valley	November 28, 1989	Mad River (Creemore)
Nottawasaga Valley	November 29, 1989	Spring Creek (Alliston)
Moira River	February 13, 1990	Upper Belle Creek
Nottawasaga Valley	February 27, 1990	Willow Creek (Oro Township)
Cataraqui Region	March 19, 1990	Millhaven Creek
Township of East Hawkesbury	March 19, 1990	Ottawa River
Town of Hawkesbury, West Hawkesbury Township	March 20, 1990	Hawkesbury Creek
Hamilton Region	March 27, 1990	Ancaster Creek Sulpher Creek

Public Information Maps Currently Available

- Oshawa Area, Ontario (Pilot Project)
- White River Watershed
- Atikokan River
- Nipigon Township

- Kaministiquia River
- Metropolitan Toronto and Region Conservation Authority, Map #1 - #8
- Nickel District Conservation Authority - entire watershed
- Hanlon's Creek

- Mill (Galt) Creek and Irish Creek
- Lower Trent Region, Map #1-#8
- Sturgeon River/Lake Nipissing/French River Watershed, Map #1 - #5
- Lake Huron Shoreline, Map #1 - #2

- Village of Lakefield
- North Monaghan Township
- Thessalon
- Espanola

- Goulais River
- Nith River, Map #1 - #2
- Conestogo River
- Moira River, Map #1 - #3

- Bell Creek
- Little Cataraqui Creek
- Dresden

- Township of Hornepayne
- Township of McNab
- Township of Petawawa
- Gananoque River Watershed, Maps #1 - #3

- Town of Port Stanley
- Pefferlaw Brook, Uxbridge Brook
- Beaverton River, Zephyr Creek . Whites Creek, Maps #1 - #3
- Moira River (Hwy 401 South to the Bay Quinte)

- Raisin Region (North & Main Branch of Raisin River, Gray's Creek Maps #1 - #10
- Town of Dryden (Swanson Creek, Wabigoon River, Wabigoon Lake)

- Township of Ignace (Agimak River Agimak Lake)
- Village of Schreiber (Cooks Creek)

- Indian River *
- Otonabee River *
- Village of Port Stanley (Kettle Creek)*
- Village of Iron Bridge (Mississaugi River)*
- Town of Chapleau*
- Town of Ashfield (Lake Huron Shoreline Map #3)*
- Town of Bracebridge (Muskoka Rivers)*

* Maps produced in 1989/90.

APPENDIX A

Expenditures for the Canada/Ontario Flood Damage Reduction Program

1978/79 - 1989/90

APPENDIX A

EXPENDITURES FOR THE CANADA/ONTARIO FLOOD DAMAGE REDUCTION PROGRAM
CONSERVATION AUTHORITIES

Conservation Authority	1989/90	1988/89	1987/88	1986/87	1985/86	1984/85	1977/78-1983/84	Total Accumulated
Ausable Bayfield	20,913.00	36,652.00	38,465.00	513.09	3,382.50	3,100.00	35,000.00	138,025.59
Cataraqui Region	121,205.74	29,169.81	31,938.63	75,469.66	18,074.79	20,090.00	279,039.76	574,988.39
Catfish Creek	10,552.00							10,552.00
Central Lake Ontario	18,091.99						22,133.00	40,224.99
Credit Valley	10,181.63					35,135.66	295,281.15	340,598.44
Essex Region	760.00	100,853.00	1,593.00	2,415.00	16,557.25	23,500.00	337,347.53	483,025.78
Grand River	21,222.23	101,758.91	171,635.00	131,285.71	106,818.91	138,454.42	368,131.28	1,039,306.46
Grey Sauble	15,836.70	86,048.00						101,884.70
Halton Region	18,371.33	3,105.00	45,801.00	43,423.92	32,016.79	68,393.35	322,779.44	533,890.83
Hamilton Region	32,890.00	152,653.00	49,550.00	16,960.00	1,920.00			253,973.00
Kettle Creek	18,816.50	14,739.20			23,526.11			57,081.81
Lakehead Region		21,985.42					1,535.94	23,521.36
Lake Simcoe Region	6,557.00	9,891.80	19,489.94	18,470.06	41,448.11	94,239.81	623,831.26	813,927.98
Long Point Region	69,372.13	62,862.00						132,234.13
Lower Thames Valley	81,743.70	87,152.00	13,266.00					182,161.70
Lower Trent Region	25,656.35			17,108.40	7,133.26		252,201.21	302,099.22
Maitland Valley	1,982.00		1,618.83	32,679.77	459.32	47,574.65		84,314.57
M.T.R.C.A.	39,947.00	67,131.00	88,278.00	60,001.00			735,692.32	991,049.32
Mississippi Valley	5,178.61	3,467.63	1,029.57			43,102.47	423,882.51	476,660.79
Moira River	63,009.44	27,058.86	13,336.69				341,488.46	444,893.45
Napanee Region	2,547.15							2,547.15
Niagara Peninsula	79,981.40	156,229.00	26,548.00	20,000.00	27,845.00	76,530.85	310,413.39	697,547.64
Nickel District	1,949.50	11,843.05	39,619.62	65,287.39	405.76	8,286.97	729,983.21	857,375.50
North Bay-Mattawa	165.26			9,963.26				10,128.52
Nottawasaga Valley	100,158.00	62,408.00	61,556.48	163,520.03	922.50	21,914.34	36,283.77	446,763.12
Otonabee Region	67,192.00	75,617.00		3,438.00			152,903.00	299,150.00
Prince Edward Region	94,313.75	2,000.00	32,721.40	81,901.51	22,198.52			233,135.18
Raisin Region	627.47	22,913.03	6,744.08	35,777.58	80,106.93	40,208.30		186,377.39
Rideau Valley	4,889.58	6,059.65	44,380.96	37,800.00	3,131.51		154,727.13	250,988.83
Saugeen Valley	80,773.69	50,912.00	48,737.83					180,423.52
Sault Ste. Marie	1,871.00		9,876.43	7,123.57	10,633.65			29,504.65
South Nation	34,770.75	24,745.09	90,867.54					150,383.38
St. Clair Region	64,300.30	16,895.00	1,955.67				7,365.00	90,515.97
Upper Thames River							207,092.21	207,092.21
L.Erie/L.Huron Shoreline		107,043.26						107,043.26
SUB-TOTAL #1	1,115,827.20	1,341,192.71	839,009.67	823,137.95	396,580.91	620,530.82	5,637,111.57	10,773,390.83

EXPENDITURES FOR THE CANADA/ONTARIO FLOOD DAMAGE REDUCTION PROGRAM
OUTSIDE CONSERVATION AUTHORITIES AND OTHER EXPENDITURES

Municipalities Ouside Conservation Authorities	1989/90	1988/89	1987/88	1986/87	1985/86	1984/85	1977/78-1983/84	Total Accumulated
Atikokan					1,826.64		29,591.35	31,417.99
Anson,Hindon,Minden		2,014.82	720.75	3,000.00	8,499.50	284.69	39,370.98	53,890.74
Bancroft	41,491.44	40,655.64	55,835.00					137,982.08
Bracebridge	17,026.99	3,232.07	160,196.50	17,720.00				198,175.56
Chapleau	266.20	1,137.56	9,434.39		3,057.29	9,170.63	5,307.56	28,373.63
Dryden		1,394.06		25,700.00				27,094.06
Hawkesbury		2,790.00	24,315.58	1,630.59	10,467.77			39,203.94
Espanola				1,034.34			63,203.69	64,238.03
Goulais River				1,700.00		10,575.43	134,765.37	147,040.80
Gravenhurst/Orillia/Rama	145,451.11	26,275.00						171,726.11
Hearst	396.71				9,434.39	8,033.86	2,235.11	20,100.07
Hornepayne		1,394.06						1,394.06
Huntsville	3,040.00	65,049.75	49,390.00					117,479.75
Ignace		1,394.06		31,000.00				32,394.06
Ironbridge	1,394.06	1,500.59		6,965.00				9,859.65
James		6,900.00	18.58				54,885.96	61,804.54
Lake Nipissing							170,632.27	170,632.27
Matheson	15,080.00	1,150.00						16,230.00
McNab		1,728.52			1,689.70		28,881.00	32,299.22
Muskoka Hydrology Study		5,000.00	15,936.77	57,448.84				78,385.61
Nolalu/Red Rock	26,227.00							26,227.00
Nipigon					1,575.36	8,658.68	11,332.99	21,567.03
Ottawa River-RMOC						19,137.74	46,731.09	65,868.83
Ottawa River-Rockland						4,744.32	295.60	5,039.92
Petawawa		1,721.26			1,699.63		34,140.00	37,560.89
Schreiber		1,394.06		35,300.00				36,694.06
Somerville	77,847.00	48,003.00						125,850.00
Thessalon				1,235.67			30,836.27	32,071.94
Westmeath	35,119.27		63,900.70	50,761.30	21,029.39	27,560.61		198,371.27
White River							18,000.00	18,000.00
Wicksteed			103.62				13,380.50	13,484.12
L.Erie/L.Huron Shoreline		150,006.30						150,006.30
Horizontal Controls			178,934.91					178,934.91
								0.00
Other Expenditures								0.00
Administration	110,358.22	84,858.83	54,956.69	59,152.88	60,892.00	42,865.57	98,855.41	511,939.60
EMR Review	41,949.99	73,000.00	22,590.50	12,947.50	7,688.00	6,675.00	71,945.60	236,796.59
Cartographic Services	15,691.00	45,953.60	20,807.00	7,704.50				90,156.10
Main Office Shoreline	360,527.13							360,527.13
SUB-TOTAL #2	891,866.12	566,553.18	657,140.99	313,300.62	127,859.67	137,706.53	854,390.75	3,548,817.86

APPENDIX A (CONTINUED)

EXPENDITURES FOR THE CANADA/ONTARIO FLOOD DAMAGE REDUCTION PROGRAM
OTHER MEASURES

Other Measures Studies	1989/90	1988/89	1987/88	1986/87	1985/86	1984/85	1977/78-1983/84	Total Accumulated
MTRCA							78,683.92	78,683.92
Muskoka R. Management					4,250.00	33,340.08	98,872.99	136,463.07
Lake Nipissing							282,430.37	282,430.37
Depth-Damage Curve						68,411.20		68,411.20
Aerial Survey of The Great Lakes				69,006.56	63,828.80			132,835.36
Residential Depth - Damage Curve				3,873.00	14,021.41			17,894.41
Floodway - Flood Fringe Analysis				13,550.00	10,875.00			24,425.00
Regional Flood Frequency Analysis				8,270.10	3,718.94			11,989.04
Goulais Rv. Floodproofing					39,001.78			39,001.78
Watershed Categorization			46,700.00	26,049.00				72,749.00
API Model				59,150.00				59,150.00
Ice Jam Frequency		15,000.00	3,583.21					18,583.21
Lake Superior Shore Damage Assessment			125,157.00					125,157.00
Radar Study		15,000.00						15,000.00
Niagara Flood Damage Centre Analysis		20,000.00	71,441.00					91,441.00
Alternative Flood Plain Mapping Techniques	14,965.00							14,965.00
Benefit/Cost Analysis of Selected FDRP Projects	14,000.00							14,000.00
Ontario Flood History Study	15,000.00							15,000.00
Hydrograph Parameter	6,500.00							
SUB-TOTAL #3	50,465.00	50,000.00	246,881.21	179,898.66	135,695.93	101,751.28	459,987.28	1,218,179.36

APPENDIX A (CONUED)

EXPENDITURES FOR THE CANADA/ONTARIO FLOOD DAMAGE REDUCTION PROGRAM

PUBLIC RELATIONS AND WORKS

Public Relations	1989/90	1988/89	1987/88	1986/87	1985/86	1984/85	1977/78-1983/84	Total Accumulated
Slide Show			18,737.00				1,816.58	20,553.58
National Brochure							5,458.30	5,458.30
Ontario Brochure				12,147.73			9,721.65	21,869.38
Film							20,000.00	20,000.00
Display							1,000.00	1,000.00
Catalogue				4,261.59		507.29		4,768.88
Seminar Supplies			1,756.22					1,756.22
Flood News and Views	2,327.00							2,327.00
Generic Surround	2,985.00							2,985.00
Works								0.00
								0.00
White River Embankment							35,620.72	35,620.72
SUB-TOTAL #4	5,312.00	0.00	20,493.22	16,409.32	0.00	507.29	73,617.25	116,339.08
Audit Adjustment #5	(20,682.26)	(33,539.11)		29,449.08			(19,520.00)	(44,292.29)
GRAND TOTAL(1+2+3+4+5)	2,042,788.06	1,924,206.78	1,763,525.09	1,362,195.63	660,136.51	860,495.92	7,005,586.85	15,618,934.84

APPENDIX B

PROGRESS REPORT
PART 1

RIVERINE PROJECTS

APPENDIX B

PROGRESS REPORT

PART ONE - RIVERINE PROJECTS

A.

Conservation Authority	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[0]/COMPLETED[X] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
Ausable-Bayfield	(a) Various Urban Watercourses	Township of Stephen (Crediton) Village of Grand Bend, Village of Lucan	X	X	0	
	(b) The Cut	Township of Bosanquet, Township of Stephen, Township of McGillivray	X	X		
Cataraqui Region	(a) Gananoque River Watershed	Town of Gananoque, Township of Front of Leeds and Lansdowne, Township of Front of Yonge and Escott, Township of Rear of Leeds and Lansdowne, Township of of Rear of Yonge and Escott, Township of South Cosby.	X	X	X	May 15, 1989
	(b) Little Cataraqui Creek	City of Kingston	X	X	X	March 31, 1988

A.

Conservation Authority	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[0]/COMPLETED[X] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
	(c) Millhaven Creek	Township of Ernestown, Township of Kingston, Township of Loughborough, Township of Portland	X	X	0	
	(d) Butternut Creek	Township of Pittsburgh	X	0	0	
Catfish Creek	---					
Central Lake Ontario	(a) Corbett Creek, Oshawa Creek, Goodman Creek, Harmony Creek, Farewell Creek	City of Oshawa	X	X	X	Pilot Project complete
Credit Valley	(a) Credit River	City of Brampton, City of Mississauga, Town of Caledon, Town of Halton Hills, Town of Orangeville, Township of Erin.	X	X	0	Flood Damage Centre Analysis complete 1 Open House
Crowe Valley	---					
Essex Region	(a) Turkey Creek, Sturgeon Creek, Cedar Creek, Wigle Creek, Mill Creek, Canard River, Big Creek, Lake Erie, Detroit River, Lake St. Clair	City of Windsor, Town of Amherstburg, Town of Kingsville, Town of Anderdon, Township of Colchester S., Township of Colchester N., Township of Gosfield S., Township of Leamington, Township of Malden, Township of Mersea, Township of Sandwich W.	0	X	0	

A.

Conservation Authority	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[0]/COMPLETED[X] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
Ganaraska Region	---					
Grand River	(a) Hanlon's Creek, Galt Creek, Irish Creek	Cambridge City, Township of North Dumfries, Township of Puslinch	X	X	X	March 31, 1987
	(b) Nith River, Conestoga River	Township of Blandford - Blenheim, Township of Wilmont, Township of Peel	X	X	X	March 31, 1988 Dec. 1-2, 1988
	(c) Speed River, Eramosa River	Eramosa Township, Puslinch Township, City of Guelph	X	X	0	
	(d) Baden Creek	Wilmot Township - Baden Settlement Area	X	X	0	
	(e) Grand River Hydrology Study		0			Hydrology Study only
Grey Sauble	---					
Halton Region	(a) Bronte (12-Mile) Creek	City of Burlington, Town of Milton, Township of Flamborough	X	X	0	

A.

Conservation Authority	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[0]/COMPLETED[X] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
	(b) Grindstone (14-Mile) Creek	Regional Municipality of Halton, Regional Municipality of Hamilton-Wentworth, Township of Flamborough	X	X	0	
	(c) Oakville (16-Mile) Creek	Regional Municipality of Halton, Town of Halton Hills, Town of Milton, Town of Oakville	X	X	0	
	(d) Joshua Creek	Town of Oakville	X	X	0	
	(e) Oakville (16-Mile) Creek	Reservoir Study	X			Damage Centre Analysis Study
Hamilton Region	(a) Stoney Creek, Battlefield Creek, Various watercourses	City of Stoney Creek	X	X		
	(b) Spencer Creek & Tributaries	Town of Ancaster, Town of Dundas, Town of Flamborough	X		Hydrology Study only	
	(c) Spencer Creek and Tributaries	Town of Ancaster	X	X	0	
Kawartha Region	---					
Kettle Creek	(a) Kettle Creek	Town of Port Stanely	X	X	X	May 15, 1989

A.

Conservation Authority	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[9]/COMPLETED[X] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
Lakehead Region	(a) Kaministiquia River	City of Thunder Bay, Township of Paipoonge			X	August 5, 1983
Lake Simcoe Region	(a) Pefferlaw Brook, Uxbridge Brook, Beaverton River, Zyphr Creek, Whites Creek	Township of Uxbridge, Township of Georgina, Township of Brock	X	X	X	March 17, 1989
	(b) Holland River	Town of Bradford East, Town of Gwillimbury, Town of Whitechurch-Stouffville, Township of King, Township of West Gwillimbury	0	X		
Long Point Region	---					
Lower Thames Valley	(a) Thames River	City of Chatham	0	X		
Lower Trent	(a) Trent River, Colborne Creek, Mill Creek, Trout Creek, Barnham House Creek, Butler Creek, Glen Miller Creek, Killoran Creek, Mayhew Creek, Rawdon Creek, Shelter Valley Creek	City of Trenton, Town of Campbellford, Township of Brighton, Township of Haldimand, Township of Seymour, Township of Sidney, Village of Brighton, Village of Colborne, Village of Sterling, Village of Warkworth, Village of Frankford, Village of Hastings	X	X	X	March 31, 1987

A.

Conservation Authority	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY*/COMPLETED* Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
Maitland Valley	(a) Lake Huron Shoreline	Township of Colborne, Township of Goderich	X	X	X	March 31, 1987
	(b) Lake Huron Shoreline	Township of Ashfield	X	X	X	January 31, 1990
Mattagami Region	---					
Metro Toronto Region	(a) Don River, Humber River, Rouge River, Duffin Creek, Etobicoke Creek, Highland Creek, Mimico Creek, Petticoat Creek, Carruthers Creek	Metropolitan Toronto, Regional Municipality of Durham, Regional Municipality of York	X	X	X	December 9, 1982
	(b) Don River, Humber River, Rouge River, Duffin Creek, Etobicoke Creek, Highland Creek, Mimico Creek, Petticoat Creek, Carruthers Creek	Metropolitan Toronto, Regional Municipality of Durham, Regional Municipality of York	X	X	X	Damage Centre Analyses Complete
	(c) Lake Ontario Shoreline	Metropolitan Toronto	X	X	0	

A.

Conservation Authority	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[9]/COMPLETED[X] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
	(c) Main and East Humber River, Don River, Rouge River, Mimico Creek, Duffin Creek, Carruthers Creek, Petticoat Creek, Frenchman's Bay Watershed, Highland Creek, Rainbow Creek	Town of Markham, Town of Vaughan, Town of Richmond Hill, City of Brampton, Town of Whitechurch-Stouffville, Town of Caledon, Township of King, Town of Ajax, Town of Pickering, City of Mississauga, Metropolitan Toronto, Township of Adjala, Township of Mono, Township of Uxbridge	0	X		
Mississippi Valley	(a) Carp River, Mississippi River, Indian Creek, Poole Creek, Watts Creek, Kizell Drain, Shirley's Brook, Taylor Lake, Clayton Lake, Cody Creek	Regional Municipality, of Ottawa-Carleton, City of Kanata, City of Nepean, City of Ottawa, Town of Almonte, Town of Carleton Place, Township of Beckwith, Township of Pakenham, Township of West Carleton, Township of Ramsay	X	X	X	May 15, 1989
	(b) Ottawa River (Arnprior to east boundary of the Town of Rockland)	Regional Municipality of Ottawa-Carleton, City of Kanata, City of Ottawa, City of Nepean, West Carleton Township, Town of Rockland	X	X	X	May 15, 1989

A.

Conservation Authority	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[0]/COMPLETED[X] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
Moira River	(a) Moira Creek (Hwy 401 north to Hwy 7), Bell Creek	City of Belleville, Township of Elzevir, Township of Grimsthorpe, Township of Huntingdon, Township of Thurlow, Township of Rawden	X	X	X	March 31, 1988
	(b) Moira River (Hwy 401 south to the Bay Quinte)	City of Belleville	X	X	X	March 17, 1989
	(c) Bell Creek Extension	City of Belleville, Thurlow Township	X	X	0	
Napanee Region	------					
Niagara Peninsula	(a) Black and Beaver Creeks, Welland River, Forkes Creek	Town of Ancaster, Township of Glanbrook, Township of West Lincoln, Township of Wainfleet, Town of Pelham, City of Welland, City of Niagara Falls, Town of Fort Erie, City of Thorold	X	X	0	January 31, 1990
	(b) 20-Mile Creek	Township of Glanbrook, Township of West Lincoln, City of Hamilton	0	0		
	(c) Flood Damage Centres		X	X		Flood Damage Centre Analyses

A.

Conservation Authority	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[9]/COMPLETED[x] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
	(d) Hydrology Study	All Municipalities	0	N/A		
Nickel District	(a) Vermilion Lake, Vermilion River, Wahnapitei River, Whitefish River, Coniston Creek, Junction Creek, Nolin Creek	City of Sudbury, Town of Onaping Falls, Town of Walden, Township of Cleland, Unorganized Municipalities, Nickel Centre, Township of Wanup	X	X	X	March 31, 1987
	(b) Whitson River	Town of Chelmsford, Town of Valley East	X	0	0	
North Bay-Mattawa	(a) Lake Nipissing	North Bay City, - See Northeastern Region (a)				
	(b) Mattawa River	Town of Mattawa	X	X	0	
Nottawasaga Valley	(a) Willow Creek	Township of Oro	X	X	0	
	(b) Nottawasaga River/Pine River	Village of Angus, Township of Essa	X	X	0	
	(c) Spring Creek	Town of Alliston,	X	X	0	
	(d) Silver Creek	Town of Collingwood	X	X	0	
	(e) Hydrology Study		X	N/A		
	(f) Mad River	Village of Creemore, Township of Nottawasaga	X	X	0	

A.

Conservation Authority	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY°/COMPLETED[x] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
Otonabee Region	(a) Otonabee River, Cavanville Creek, Jackson Creek	Township of North Monaghan	X	X	X	March 31, 1987
	(b) Otonabee River, Ray's Creek, Indian River	Village of Lakefield, Township of Otonabee, Township of Dummer	X	X	X	March 31, 1987
	(c) Indian River	South Monaghan Township, Otonabee Township	X	X	X	May 15, 1989
	(d) Otonabee River	South Monaghan Township, Otonabee Township	X	X	X	May 15, 1989
Prince Edward Region	(a) Lake Ontario (Bay of Quinte)	Township of Ameliasburg	X	X		
	(b) Lake Ontario	Sophiasburg Township	X	0		
Raisin Region	(a) North and Main Branch of Raisin River, Gray's Creek	Township of Cornwall, Township of Charlottenburgh, Township of Roxborough, Township of Osnabruck.	X	X	X	May 15, 1989
Rideau Valley	(a) Rideau River (Hog's Back Dam to Rideau Falls)	Regional Municipality of Ottawa-Carleton, City of Ottawa, City of Vanier	X	X	0	

A.

Conservation Authority	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[0]/COMPLETED[X] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
	(b) Rideau River (Mooney's Bay to Kars)	Regional Municipality of Ottawa-Carleton, City of Nepean, City of Ottawa, Township of Gloucester, Township of Osgoode, Township of Rideau	X	X	0	
	(c) Ottawa River	Regional Municipality of Ottawa-Carleton, City of Nepean, City of Ottawa, City of Gloucester (See Mississippi Region C.A. (b))				
Saugeen Valley	(a) Various Watercourses	Town of Southampton	0	X		
Sault Ste. Marie Region	(a) Root River	City of Sault Ste. Marie	X	X	0	January 31, 1990
St. Clair Region	(a) East Branch Sydenham River	Town of Dresden	X	X	X	March 31, 1988
South Nation River	(a) Bear Brook Creek	Township of Cumberland	0	X		
Upper Thames River	(a) Thames River (5 Tributaries) Pottersburg Creek, Mud Creek, Medway Creek, Avon River, Dingman Creek	Town of Ingersoll, City of London, Township of Westminster, Town of Stratford, Town of Avon	X	X	0	

B. MNR Regions: Outside of C.A.S	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY°/COMPLETED^x Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
Algonquin Region	(a) Gull River	Township of Anson, Township of Hindon, Township of Minden Township of Lutterworth	X	X	0	July 14, 1989
	(b) Ottawa River	Township of McNab	X	X	X	October 31, 1988
	(c) Ottawa River	Township of Petawawa	X	X	X	October 31, 1988
	(d) Ottawa River	Westmeath Township	0	0		
	(e) Muskoka River (N. & S. Branches)	Town of Bracebridge	X	X	X	August 31, 1989
	(f) York River	Village of Bancroft, Town of Herschel, County of Hastings	X	X	0	
	(g) Big East River	Town of Huntsville	X	X	0	
	(h) Muskoka River	Hydrology Study	X	N/A		
	(i) Severn River	Town of Gravenhurst, City of Orillia, Township of Rama	0	0		
	(j) Burnt River	Township of Sommerville	0	0		
North Central Region	(a) Atikokan River	Township of Atikokan	X	X	X	March 21, 1986
	(b) Nipigon River	Township of Nipigon	X	X	X	March 21, 1986
	(c) Cooks Creek	Township of Schreiber	X	X	X	May 15, 1989
	(d) Whitefish River	Village of Nolalu	X	X		
	(e) Big Trout Creek	Township of Red Rock	0	0		

B. MNR Regions: Outside of C.A.S	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[o]/COMPLETED[x] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
Northeastern Region	(a) Sturgeon River, Lake Nipissing, French River	City of North Bay, Town of Sturgeon Falls, Township of Caldwell, Township of Cosby, Township of Mason, Township of Martland, Township of Nipissing, Township of North Himsworth, Township of Springer, Township of Bigwood, Township of Commanda, Township of Delamere, Township of Dunnet, Township of MacPhersen, Township of Mowat, (Unorganized Municipalities)	X	X	X	March 31, 1983
	(b) White River, Picnic Lake, Picnic Creek	Town of White River	X	X	X	August 16, 1982
	(c) Spanish River, Darkie Creek	Town of Espanola	X	X	X	August 20, 1987
	(d) Thessalon River, North Channel - Lake Huron	Town of Thessalon	X	X	X	August 20, 1987
	(e) Goulais River	Township of Fenwick, Township of Hodgins, Township of Vankoughnet (Unorganized Municipalities)	X	X	X	August 20, 1987

B.

MNR Regions: Outside of C.A.S	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[9]/COMPLETED[x] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
	(f) Mississagi River	Village of Iron Bridge	X	X	X	May 15, 1989
Northern Region	(a) Montreal River (Elk Lake)	Township of James	X	X	0	
	(b) Little Jackfish River	Township of Hornepayne	X	X	X	August 1, 1988
	(c) Kebsquasheshing River, Nebskwashi River, Bucciarelli Creek	Township of Chapleau	X	X	X	January 31, 1990
	(d) Mattawishkwia River	Town of Hearst	X	X	X	January 31, 1990
	(e) Black River	Town of Matheson	0	0		
Northwestern Region	(a) Swanson Creek, Wabigoon River, Wabigoon Lake	Town of Dryden	X	X	X	May 15, 1989
	(b) Agimak River, Agimak Lake	Township of Ignace	X	X	X	May 15, 1989
Eastern Region	(a) Ottawa River	Township of East Hawkesbury	X	X	0	
	(b) Hawkesbury Creek	Town of Hawkesbury, West Hawkesbury Township	X	X	0	

B. MNR Regions: Outside of C.A.S	Whole or Portions of Watercourse(s)	Whole or Portions of Municipalities	WORK UNDERWAY[0]/COMPLETED[X] Hydro-Technical Studies	Mapping Studies	Public Information Maps	Identification Date
	(c) Ottawa River	Regional Municipality of Ottawa-Carleton (see Mississippi Valley (b))				
	(d) Ottawa River	Township of Rockland (see Mississippi Valley (b))				

APPENDIX B
PROGRESS REPORT

PART 2

SHORELINE PROJECTS

APPENDIX B
PROGRESS REPORT

PART TWO - SHORELINE MAPPING

CONSERVATION AUTHORITY	WHOLE OR PORTIONS OF MUNICIPALITIES	SHORELINE	WORK UNDERWAY°/COMPLETED^x AERIAL SURVEY DATABASE	FLOOD RISK MAPPING	P.I. MAPS
Ausable-Bayfield	Township of Bosanquet Township of Stephen Township of Hay Township of Stanley Village of Grand Bend Township of Goderich Village of Bayfield	Huron	X	O	
Cataraqui Region	Township of North Fredericksburgh Township of South Fredericksburgh Township of Adolphustown Township of Ernestown Village of Bath Township of Kingston City of Kingston Township of Pittsburgh Township of Front of Leeds of Lansdowne Township of Front of Escott Township of Front of Yonge Town of Gananoque Township of Elizabethtown City of Brockville	Ontario St. Lawrence R.	X X		
Catfish Creek	Township of Yarmouth Township of Malahide	Erie	X	O	
Central Lake Ontario	City of Oshawa Town of Ajax Town of Whitby Town of Pickering Town of Newcastle	Ontario	X		

CONSERVATION AUTHORITY	WHOLE OR PORTIONS OF MUNICIPALITIES	SHORELINE	AERIAL SURVEY DATABASE	WORK UNDERWAY*/COMPLETED* FLOOD RISK MAPPING	P.I. MAPS
Credit Valley	City of Mississauga	Ontario	X		
Essex Region	Township of Tibury North Township of Rochester Town of Bell River Township of Maidstone Village of St. Clair Beach Town of Tecumseth City of Windsor Township of Sandwich West Township of Anderson Town of Amherstburg Township of Malden Township of Colchester South Township of Gosfield South Town of Kingsville Town of Leamington Township of Mersea	Erie Detroit River Lake St. Clair	X		
Grand River	Town of Haldimand Town of Dunville	Erie	X	O	
Grey Sauble	Township of Amabel Township of Aldemarle Town of Wiarton Township of Keppel Township of Sarawak City of Owen Sound Township of Sydenham Township of St. Vincent Town of Meaford Township of Collingwood Town of Thornbury	Huron Georgian Bay	X X		

WORK UNDERWAY[o]/COMPLETED[x]

CONSERVATION AUTHORITY	WHOLE OR PORTIONS OF MUNICIPALITIES	SHORELINE	AERIAL SURVEY DATABASE	FLOOD RISK MAPPING	P.I. MAPS
Halton Region	Town of Oakville City of Burlington Regional Municipality of Halton	Ontario	X		
Hamilton Region	City of Hamilton City of Stoney Creek Town of Grimsby	Ontario	X		
Kettle Creek	Township of Southwold	Erie	X	O	
Long Point Region	Town of Haldimand City of Nanticoke Township of Delhi Township of Norfolk Township of Bayham Village of Port Burwell	Erie	X	O	
Lower Thames Valley	Township of Tillbury North Township of Dover Village of Erie Beach Village of Erieau Township of Harwich Township of Howard	Erie Lake St. Clair	X X	O	
Lower Trent	Township of Haldimand Township of Cramahe Township of Brighton Town of Brighton Township of Murray City of Trenton Township of Sidney	Ontario	X		
Metro. Toronto & Reg.	City of Toronto City of Scarborough	Ontario	X		

CONSERVATION AUTHORITY	WHOLE OR PORTIONS OF MUNICIPALITIES	SHORELINE	WORK UNDERWAY*/COMPLETED* AERIAL SURVEY DATABASE	FLOOD RISK MAPPING	P.I. MAPS
Moira River	City of Belleville Township of Sidney Township of Thurlow	Ontario (Bay of Quinte)	X		
Napanee Region	Town of Deseronto Township of Richmond Township of North Fredericksburgh Town of Napanee	Ontario (Bay of Quinte)	X		
Niagara Peninsula	Town of Dunville Township of Wainfleet City of Port Colbourne Town of Fort Erie Town of Niagara on the Lake City of St. Catherines Town of Lincoln Town of Grimsby	Ontario Erie	X X	O	
Nottawasaga	Town of Collingwood Township of Nottawasaga Town of Wasaga Beach	Georgian Bay	X		
Prince Edward Region	Township of Hillier Township of Athol Township of South Marysburgh Township of North Marysburgh Township of Hallowell Township of Ameliasburgh Township of Sophiasburgh	Ontario Bay of Quinte	X X		
Saugeen	Township of Huron Town of Kincardine City of Kincardine	Huron	X	O	

CONSERVATION AUTHORITY	WHOLE OR PORTIONS OF MUNICIPALITIES	SHORELINE	DATABASE	WORK UNDERWAY[0]/COMPLETED[X] TOPOGRAPHIC MAPPING	FLOOD RISK MAPS	P.I. MAPS
St. Clair	Township of Bosanquet Township of Plymouth Township of Clearwater City of Sarnia	Huron Lake St. Clair	X	O		

APPENDIX B

PROGRESS REPORT

PART 3

OTHER FLOOD DAMAGE REDUCTION MEASURES STUDIES

APPENDIX B

PROGRESS REPORT

PART THREE - OTHER FLOOD DAMAGE REDUCTION MEASURES

Flood Reduction Study of the Sturgeon River/Lake Nippissing/French River System v. 1-3 MacLaren Plansearch 1981

Water Management Improvement Study of the Muskoka River System MacLaren Plansearch 1985

Development of Flood Depth-Damage Curves for Residential Homes in Ontario Paragon Engineering Limited 1985

Regional Flood Frequency Analysis for Ontario Streams v. 1-3 S.M.A Moin and M.A. Shaw, Environment Canada 1986

Report on the Categorization of Watersheds for Operational Flood Forecasting Marshall Macklin Monaghan 1988

Examination and Development of the Antecedent Precipitation Index (API) Method for Runoff Prediction in Ontario MacLaren Plansearch 1987

Definition Study of Floodway-Fringe for Riverine and Lake Flooding MacLaren Plansearch 1987

Report on Lake Superior Shore Propery Damage Economic Evaluation
Marshall Macklin Monaghan 1988

Goulais River Flood Damage Reduction Survey, v. 1-4. Kresin Engineering and Planning 1988

Canada/Ontario Flood Damage Reduction Program Display

The National Flood Damage Reduction Program Audio Visual Display

Canada/Ontario Flood Dmaage Reduction Program Brochure "A New Approach to an Old Problem: 1982, 1984, 1986"

The Canada/Ontario Flood Damage Reduction Program Audio Visual Display - Updated in 1988

Ice Jam Flood Frequency Study MacLaren Plansearch 1989

WATFLOOD Radar Study University of Waterloo 1989

GRIFFS Grand River Intergrated Flood Forecast System, Grand River Consevation Authority, 1989

ASAAM Areal Snow Accumulation-Ablation Model, Grand River Conservation Authority, 1989

Alternate Flood Plain Mapping Techniques study Queen's University 1990

Benefit/Cost Analysis of Selected Projects under the Canada/Ontario Flood Damage Reduction Program
Wilfred Laurier University 1990

APPENDIX C

Steering Committee/Technical Sub-Committee/ Program Coordinators

APPENDIX C
STEERING COMMITTEE

CANADA

Mr. D. Cuthbert, Chief
Water Planning and Management Branch
Inland Waters Directorate
Ontario Region, Environment Canada
Canada Centre for Inland Waters
Box 5050, 867 Lakeshore Road
Burlington, Ontario
L7R 4A6
Phone: (416) 336-4713
FAX: (416) 336-4989

Mr. H. Foerstel, Chief
Socio-Economic Division
Water Planning and Management Branch
Inland Waters Directorate
Environment Canada
9th Floor, Place Vincent Massey
351 St. Joseph Blvd.
Hull, Quebec
K1A 0E7
Phone: (613) 953-1512
FAX: (613) 997-8701

ONTARIO

Mr. M.G. Lewis (Chairman of SC)
Director
Conservation Authorities and
Water Management Branch
Ontario Ministry of Natural Resources
Room 5620, Whitney Block
Queen's Park, Toronto, Ontario
M7A 1W3
Phone: (416) 965-6285
FAX: (416) 965-0999

Phyllis Miller
Manager
Conservation Authorities Section
Ontario Ministry of Natural Resources
Room 5620, Whitney Block
Queen's Park
Toronto, Ontario
M7A 1W3
Phone: (416) 965-6285
FAX: (416)965-0999

STEERING COMMITTEE
OBSERVERS

CANADA

Mr. Doug Brown, Head Engineering Div.
Water Planning & Management Branch
Inland Waters Directorate, Ontario Reg.
Environment Canada
Canada Centre for Inland Waters
Box 5050, 867 Lakeshore Road
Burlington, Ontario L7R 4A6
Phone: (416) 336-4714
FAX: (416) 336-4989

Dr. Syed Moin, Senior Flood Studies Engineer
Water Planning & Management Branch
Inland Waters Directorate, Ontario Reg.
Environment Canada
Canada Centre for Inland Waters
Box 5050, 867 Lakeshore Road
Burlington, Ontario L7R 4A6
Phone: (416) 336-4958
FAX: (416) 336-4989

ONTARIO

Pearl L. McKeen, Acting Manager
Policy & Program Dev. Section
Conservation Auth. & Water Mgmt.
Ontario Ministry of Natural Resources
99 Wellesley St., W., Room 5620
Whitney Block, Queen's Park
Toronto, Ontario M7A 1W3
Phone: (416) 965-6285
FAX: (416) 965-0999

Mr. J. Kelleher, General Manager
Lower Trent Region C.A.
441 Front Street
Trenton, Ontario
Phone: (613) 394-4829
FAX: (613) 394-5226

Mr. Phil McKinstry
Local Planning Policy Branch
Ontario Ministry of Municipal Affairs
777 Bay Street, 13th Floor
Toronto, Ontario
M5G 2E2
Phone: (416) 585-6233

TECHNICAL SUB-COMMITTEE

CANADA

Mr. D. Brown
Head Engineering Division
Water Planning and Management Branch
Inland Waters Directorate
Ontario Region
Environment Canada
Canada Centre for Inland Waters
Box 5050, 867 Lakeshore Road
Burlington, Ontario
L7R 4A6
Phone: (416) 336-4714
FAX: (416) 336-4989

Mr. D. Anderson
Special Advisor to the Director
Topographic Mapping Division
Canada Centre for Mapping
Energy Mines and Resources Canada
Room 704, 615 Booth Street
Ottawa, Ontario
K1A 0E9
Phone: (613) 992-0924
FAX: (613) 992-4961

Dr. S. Moin, Senior Flood Studies Engineer
Water Planning and Management Branch
Inland Waters Directorate
Ontario Region
Environment Canada
Canada Centre for Inland Waters
Box 5050, 867 Lakeshore Road
Burlington, Ontario
L7R 4A6
Phone: (416) 336-4958
FAX: (416) 336-4906

Mr. Ralph Moulton
Environment Canada
Canada Centre for Inland Waters
c/o above address
Phone: (415)336-4580
FAX: (416)336-4906

Mr. Mike Shaw
Environment Canada
Canada Centre for Inland Waters
c/o above address
Phone: (416)336-4957
FAX: (416)336-4906

ONTARIO

Pearl L. McKeen, (Chairman)
Acting Manager
Policy and Program Development
Conservation Authorities and
Water Management Branch
Ontario Ministry of Natural Resources
Room 5620, Whitney Block
Queen's Park
Toronto, Ontario
M7A 1W3
Phone: (416) 965-6286
FAX: (416) 965-0999

Mr. R. Inglis
Large Scale Mapping & Client Serv.
Topographic Mapping Section
Surveys Mapping & Remote Sensing Energy
Ontario Ministry of Natural Resources
4th Floor, 90 Sheppard Avenue East
North York, Ontario
M2N 6H2
Phone: (416) 733-5097
FAX: (416)223-6215

Mr. Mark N. Law
Coastal Geomorphologist
Policy & Program Development Sect.
Conservation Authorities &
Water Management Branch
Ministry of Natural Resources
99 Wellesley St. W., Room 5620
Toronto, Ontario M7A 1W3
Phone: (416) 965-1271
FAX: (416) 965-0999

Mr. Barry Costello, O.L.S.
Manager, Topographic Data Base
Geographical Information Services
Surveys, Mapping & Remote Sensing Br.
Ministry of Natural Resources
90 Sheppard Ave. East, 4th Floor
North York, Ontario M2N 3A1
Phone: (416) 733-5090
FAX: (416)223-6215

Mr. Ron Brown, Planner **Replaced
Plans Admin. Br., North & East B. Criger
Ont. Ministry of Municipal Affairs
777 Bay St., 14th Floor
Toronto, Ontario M5G 2E5
Phone: (416) 585-6086
FAX: (416) 585-4275

PROGRAM CO-ORDINATORS

Mrs. Karen Abrahams
Co-ordinator
Canada/Ontario Flood Damage
Reduction Program
Conservation Authorities and
Water Management Branch
Ontario Ministry of Natural Resources
Room 5620, Whitney Block
Queen's Park, Toronto, Ontario
M7A 1W3
Phone: (416) 965-6281
FAX: (416) 965-0999

Ms. Ala Boyd
Assistant Co-ordinator
Canada/Ontario Flood Damage
Reduction Program
Conservation Authorities and Water
Management Branch
Ontario Ministry of Natural Resources
Room 5620, Whitney Block
Queen's Park, Toronto, Ontario
M7A 1W3
Phone: (416) 965-6281
FAX: (416) 965-0999

APPENDIX D

PROGRAM BACKGROUND

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PROGRAM BACKGROUND

The Agreement respecting Flood Risk Mapping and other Flood Damage Reduction Measures in the Province of Ontario has, as its prime objectives, the reduction of potential damage in flood plains along the shores of its rivers and lakes, and the prevention of loss of life. The agreement advocates a preventative approach to flood control by discouraging new development in flood vulnerable areas.

The Agreement

Canada and Ontario entered into "An Agreement Respecting Flood Risk Mapping and Other Flood Damage Reduction Measures" on March 31, 1978. The Agreement was substantially revised on November 5, 1982, and was amended on November 14, 1985. The mapping component of the Agreement terminates March 31, 1990, the "Other Measures" component on March 31, 1992, and the Agreement expires on March 31,1995.

A maximum cost of $17,600,000 over the period of the Agreement will be shared equally by each government. Of this amount, $15,400,000 is to be spent on flood plain delineation, with the remaining $2,200,000 for "Other Measures", as described by section 14 of the Agreement. The areas to be mapped under the program are identified in Schedule A of the Agreement.

Administration of the program is the responsibility of the Steering Committee. Appendix C lists the members of the Steering Committee, the members of the Technical Sub-Committee, and the program coordinators.

The Flood Damage Reduction Program is implemented through the local Conservation Authorities, established under the Conservation Authorities Act, Revised Statutes of Ontario, 1980, Chapter 85. In areas outside of the jurisdiction of Conservation Authorities, the program in implemented by the local municipalities, through the MNR Regional Offices.

The Policies

The policies of the Canada/Ontario Flood Damage Reduction Program are as follows:

- No new federal or provincial government buildings or structures that are vulnerable to flood damage will be built;

- Funds from provincial or federal government sources, such as the Canada Mortgage and Housing Corporation will no longer be available for new buildings or structures vulnerable to flood damage;

- Any new buildings or structures vulnerable to flood damage placed in the flood risk area after the identification of such flood risk areas will not be eligible for flood disaster assistance; and

- The federal and provincial government will encourage local municipalities to appropriately recognize flood risk areas in their planning documents and planning process so that future development will not be flood susceptible.

Work Components

(a) Flood Risk Mapping

The Flood Risk Mapping component consists of four major stages: (1) Surveys and Mapping; (2) Hydrologic Analysis; (3) Hydraulic Analysis; and, (4) Public Information.

The Surveys and Mapping stage utilizes aerial photographs or existing map bases to prepare detailed topographic maps.

The Hydrological Analysis involves determining the response of a watershed to precipitation, rapid snowmelt, or a combination of the two. The output from this hydrologic analysis, in the form of flood flows for specified periods, serves as input to the hydraulic analysis.

The Hydraulic Analysis defines the behaviour of the river reaches under consideration, and the high flood risk areas are identified. The output from the hydraulic study is drawn on the topographic map to delineate the extent of the flood risk area.

The flood risk areas are defined by the regulatory flood, consistent with Provincial Flood Plain Criteria.

The final stage of the program involves the development of Public Information maps at a scale of 1:5000 to 1:25000. Once the Minister of the Environment for Canada and the Ontario Minister of Natural Resources identify the flood risk areas, by signing the Public Information Maps, the program policies are put into effect.

Informational brochures, audio-visual displays, open-houses, and seminars on the hazards of flooding for the public, government departments, private companies and other agencies are components of the Public Information Program.

(b) Other Flood Damage Reduction Measures

F.D.R.P. funding from the "Other Measures" component will apply to the following:

i) Generic development projects beneficial to the federal and provincial governments for province-wide or regional application.

ii) Watershed basin studies for municipalities outside the jurisdiction of Conservation Authorities.

iii) Minor remedial measures proposed by municipalities outside the jurisdiction of Conservation Authorities.

In centres where other flood damage reduction measures are deemed necessary, an analysis of factors affecting land use will be conducted, an evaluation of structural and non-structural alternatives carried out, and recommendations made on the basis of effectiveness, cost resultant benefits and environmental impact.